NOTES AND EXTRACTS.

YELLOW SNOW IN MICHIGAN.

The following is from the daily journal for Grand Haven, January 27, 1902:

From 3:40 to 5 p. m. occurred the unusual phenomenon of a fall of snow of a dull yellowish tint, which covered the ground to a depth of one-fifth of an inch. High but gradually diminishing westerly winds prevailed at the time. On melting the snow, a thin film (powder-like) covered the surface of the water and the sides of the vessel, but there was no sediment at the bottom of the vessel. It is reported that this yellow snowfall extended eastward of the station about twelve miles and northward about the same distance to Muskegon, but none was observed to the westward between the sand hills and the lake shore.

Prof. C. D. McLouth, of Muskegon, made a critical examination of samples collected at that place, and found that when isolated from the snow the coloring matter was a deep shade of yellow orange, and consisted of irregular powder-like opaque or translucent grains, from $\frac{1}{2000}$ to $\frac{1}{200}$ inch in diameter, that became semipasty when wet and would sink in water. The principal constituent was an infusible substance, probably silica; iron was plainly indicated, there was but little organic matter, the material changed color distinctly in hot flame, and the specimens collected at different places were quite similar. Professor McLouth confirms the statement of the observer at Grand Haven that the deposit of yellow snow was slight on the west slope of the sand dunes. It was observed on the trunks and branches of trees, and on the upper landing of the high school tower, 105 feet above the level of the lake. The sand dunes are from 100 to 200 feet high.

From a single determination the amount of coloring matter per square foot was found to be 1.855 grains, or about 5.59 tons per square mile.

From the Grand Haven Daily Tribune we learn that Dr. Lane, the State Geologist at Lansing, was sent a sample of the yellow snow.

He pronounced the substance *loess*, a fine clayey sand found in Wisconsin and Iowa. In all probability, says Dr. Lane, the sand was picked up by a windstorm as it traversed Wisconsin and after being carried across Lake Michigan was precipitated with a light fall of snow.

Colored snow has been previously discussed in the MONTHLY WEATHER REVIEW[1] and the conclusions of Dr. Lane agree with those there given. The high wind prevailing over Lake Michigan had no doubt brought with it fine sand from the plains to the west or southwest.

It has already been shown in the MONTHLY WEATHER REVIEW for September, 1901, p. 422, that a wind of this character is liable to cause a snowfall in winter on the windward shore of the lake, "because winds blowing toward it (the shore) from the water meet with great resistances and turn upward as they surmount the sluggish air near the ground." The moisture in the air might use the sand particles as a nuclei about which to condense and form snowflakes, and these falling flakes might bring other sand particles down with them. Hence the peculiar color of the snow.—*H. H. K.*

BARTHOLOMEW'S PHYSICAL ATLAS. METEOROLOGY.

The third volume of this atlas is devoted to meteorology and has been prepared by Bartholomew and Herbertson, and edited by Alexander Buchan. It presents all parts of the world with equal fairness. Its scope is as follows:

The four hundred maps in the atlas are comprised under two heads—Climate and Weather. The climate maps summarize the observational data and form a basis for the study of the climatology of the globe. These deal with the mapping of temperature, pressure, winds, cloud, sunshine, and rainfall, and show the distribution of these factors of climate, first for the world generally, and then on a larger scale for the separate countries where numerous observations supply more detailed material. The weather maps, together with the seasonal and storm charts, show meteorological conditions over certain regions at given periods, and represent all the most characteristic weather types.

The text, descriptive and explanatory of the maps, directs attention to their prominent features and touches upon the cause and effect of special phenomena. In the appendices the list of meteorological services with their stations and publications has been compiled from direct statistics supplied by their directors. A critical bibliography gives a list of the more important books and papers of special value for reference. A glossary of meteorological terms, comparative tables, and an index have also been added.

Throughout the atlas the metric system has been systematically employed in conjunction with the usual English scales, thus affording a ready means of comparison.

An American edition of this volume is announced by J. B. Lippincott Company, Philadelphia. The price is about the same as for the English edition, or $12.50 to public libraries that are entitled to import books duty free.—*H. H. K.*

THE HURRICANES OF THE FAR EAST.[1]

The author of this work has endeavored to so arrange our knowledge of the typhoons of the far East as to render it available for the use of sailors who navigate the seas in that part of the world. He acknowledges his indebtedness to the writings of Viñes, Eliot, and Doberck, and especially to those of Algué, whose Baguios ó ciclones Filipinos forms the basis of this book.

The general style, while somewhat disconnected, is on the whole very creditable, but the translation is not free from Germanisms and errors that at times obscure the meaning.

The book is divided into four sections. The first of these is devoted to a general discussion of tropical cyclones, particularly those of the far East. Horizontal and vertical sections of typhoons are shown in plates 1 and 2; these sections are divided into quadrants and zones, and the characteristics of each are represented graphically, and also described in the text.

Typhoons or baguios are divided into three groups; (1) those of the four winter months, December–March, (2) those of the intermediate months, April, May, October, and November, and (3) those of the summer months, June–September.

The place of origin is shown to change slightly for each group, being farther south and farther east in winter than in summer.

The author maintains that the primary cause of the origin of these storms is an area of barometric depression, but the rotation of the earth and the latent heat liberated by condensation of vapor are the forces that give it the tremendous energy that is developed later.

The chapter on the "Movement of the atmosphere in cyclones" is nearly all to be found in Viñes's "Investigation of the cyclone circulation and translatory movement of West Indian hurricanes," pp. 7–12. Washington, Weather Bureau, 1898.

The movement of the barometer during the passage of tropical cyclones is divided into three periods, corresponding to the three zones of the storm. In the first, or outer, zone the barometer falls slowly, and the distinct daily fluctuations are not effaced. In the second, or middle, zone there is a distinct fall which effaces the daily fluctuations, while in the third, or inner, zone the fall is very rapid. Tables have been pre-

[1] See Vol. XVII, p. 89, Vol. XXIII, pp. 15–19, and Vol. XXIX, p. 465.

[1] By Prof. Dr. Paul Bergholz. English translation revised by Dr. Robert H. Scott, F. R. S. 271 pp., 31 plates. Bremen, 1899.

pared showing the average pressure at the boundary lines between the different zones, and also the probable distance from the center of the cyclone corresponding to certain readings of the barometer.

The different types of rainfall, including thunderstorms, experienced in the different quadrants and zones, the part condensation plays in maintaining the energy of the cyclone, and the eye of the storm, are subjects receiving special attention. Tables have also been prepared showing the mean velocity of propagation for cyclones of each group, their direction of motion when crossing the meridian of Manila, and their nearest aproach to Manila.

Section II treats of the "Indications of the approach of cyclones." The different kinds of clouds, their heights, their normal movements, and their movements in the presence of a typhoon are very fully discussed, and interesting tables of cloud heights and directions are given. It is also shown that by measuring the heights of the clouds, the inclination of the axis of the typhoon, and, therefore, its dangerous quadrant, can be determined.

Algué's barocyclometer for determining the probable position of the center of the cyclone, the swell of the cyclone, and the cyclone or storm wave are among other subjects considered.

Section III considers at length characteristic cyclones of various types, and the fourth and last section treats of "Winter storms or land storms," that approach the China Sea from the Continent of Asia.

While, as stated above, this book is intended primarily as an aid to mariners, it contains much that is of interest to the general student of meteorology.—*H. H. K.*

THE WEATHER BUREAU IN THE WEST INDIES.

It is difficult for us to fully appreciate the extent of the influence of the weather upon the ordinary affairs of life. We know in a general way that pleasant weather helps trade, and that bad weather is injurious to health; that abundant rains mean good crops, but that severe storms often destroy much property. But since we can not control the weather we are quite apt to take it as it comes, with more or less of fault finding if it is disagreeable, to be sure, but without any special effort to prepare for it until it is upon us; a blizzard finds us with empty coal bins, and a rainy day catches us abroad without an umbrella.

Until recent years perhaps this was unavoidable, but with the information now available it ought to be the exception when severe weather finds us unprepared.

It is not enough that people receive the daily weather forecasts sent out by the Chief of the Weather Bureau. A warning of a cold wave means but little to a man who knows nothing of such phenomena, as compared with the man who has studied the movements of these vast masses of cold air across our country. A warning of an approaching cyclonic storm loses much of its value unless the recipient of the warning knows something of the movements of the wind about the cyclone.

The Weather Bureau desires not only to accurately forecast the weather, but also to interest the public in the study of at least elementary meteorology, so that the greatest possible good may be derived from the daily forecasts. It aims to do this not only through the daily weather maps, the MONTHLY WEATHER REVIEW, and occasional bulletins, but also through lectures by its various officials before public schools, colleges, and societies.

The sources of information are so many and varied, and oftentimes there are so many vehicles between these sources and the public that one is in danger of losing sight of the fountain head. The educational value of the Weather Bureau and the advantages to be derived from a knowledge of meteorology are illustrated by the following quotations from the St. Croix Avis, September 14, 1901, edited by John T. Quin, Superintendent of Schools:

The presence of the United States Weather Bureau in these West Indian Islands has doubtless awakened a good deal of interest in the weather in this part of the world, and has added very largely to the number of persons who follow weather changes with intelligent interest. For such, the story of the cyclone through which we have just passed has some interesting points.

From the quite complete history of this storm, as given by the Editor of the Avis, we quote the following:

It may interest amateur observers to mention that the first hint of the recent storm was given by the sky, a careful observation of some high clouds at 5 p. m. on Tuesday, September 10, showing our editor that they were coming from east-southeast. He mentioned the fact and its probable significance to a friend at the time; a couple of hours afterwards the Weather Bureau's telegram arrived. Yesterday (the 13th) the storm having passed, the high clouds were moving slowly from about west-northwest, still coming, that is to say, from the cyclone center.

At 2 p. m., Wednesday, September 11, the following weather notes were issued from the Avis office:

Since morning the editor's aneroid barometer has fallen to 29.89 inches, and the wind has gone round to northwest. These facts mean that the disturbance already reported is passing us to the north and is at present off St. Croix to the northeast. No destructive wind is at all likely, but strong winds from northwest and west are quite possible. The clouds at our end promise rain, which would be very welcome. The wind will probably veer to west, later round through south to an easterly point.

The Avis for October 5, 1901, contains the following rainfall data:

We have been favored with a statement of the rainfall for September at the usual three stations, and combining it with previous returns, are now able to give the following statement of the total rainfall for the year to September:

Total rainfall.

Months.	Christiansted.	King's Hill.	Frederickstead.	Averages.
	Inches.	*Inches.*	*Inches.*	*Inches.*
January–June	19.47	14.34	15.23	16.51
July	15.53	10.39	9.47	11.80
August	2.13	1.64	2.16	1.98
September	12.91	14.47	21.78	16.38
Total	50.04	41.34	48.64	46.67

The average fall from 1852 to 1889 over the same period of the year is 30.91 inches; hence the fall this year up to the present exceeds the average by 15.76 inches. The average fall for September, over the same 38 years, is 6.78 inches, so that last month's average for the island is nearly three times the general September average.

The characteristics of cyclones in general, and especially the determination of their probable paths from the readings of the barometer and observations of the direction of movement of the wind and clouds are discussed in the Avis for October 5 and 26, November 2 and 9.

In the number for November 2 the following extra bulletins were reprinted:

To be on the safe side I think it desirable to publish the following, without intending thereby to cause needless alarm.

The day's weather signs up to the present seem to indicate that a storm center is advancing in about our direction from the west. The wind may become much stronger, and is likely to blow from the west and northwest.

The barometer should be watched, and if it continues to fall preparations should be made to meet possible bad weather. Yesterday it stood at about 30.00, to-day as follows: 7-10 a. m., 29.90; 11 a. m., 29.98; noon, 29.86; 1 p. m., 29.85; 1:30 p. m., 29.84; 8 p. m., 29.82.—Ed. Bulletin. (Extract to Bulletin of October 30, issued at 3 p. m.)

Havana Weather Bureau reports decided barometric depression north-northwest of Porto Rico, storm winds not indicated.

The above shows us where the cyclone center was this morning. The wind direction here was in harmony with this. The center was south of Hayti yesterday and has moved from about west-southwest to east-northeast. It will be at its nearest to us a little later in the day when the wind has gone round to about west-southwest. It is consoling to learn that no storm winds need be expected. Again a cyclone has brought us splendid rains. We do not say our fifth for the month, for